

# Oglethorpe Oak

## (Quercus oglethorpensis)

by Dr. Kim D. Coder, Professor of Tree Biology,  
Warnell School of Forestry & Natural Resources, University of Georgia

Oglethorpe oak (Quercus oglethorpensis) is a newcomer in the tree identification world. Originally thought by botanists to be a Southern form of shingle oak (Quercus imbricaria), a more careful series of observations proved otherwise. Oglethorpe oak was identified along a quiet creek in 1940 by a brilliant plant taxonomist, Professor Wilbur Duncan. He named the tree after Oglethorpe County, Georgia where he had first identified the tree. The name honors British general James E. Oglethorpe (1696-1785), founder of the city of Savannah and the colony of Georgia.

### White Oak By Any Other Name

Oglethorpe oak is a member of the beech family. Oglethorpe oak is in the white oak group of oaks, and was probably not recognized earlier because its bark closely resembles white and post oak, which also grow in the area. The typical tree of record was discovered along Buffalo Creek, 8 miles east of Lexington, GA in 1940. This oak is a rarity and is seldom seen partially because of its low population numbers and because of its isolated habitat. Seedlings in the wild are rare. Small to medium sized trees will produce stump sprouts if damaged.

Oglethorpe oak is not listed or given any federal protection, but is a species which has been examined for federal protection. It was given a relative low priority compared with other species. It is listed by Georgia as “threatened” and by South Carolina as “rare.” By most definitions of protected species legislation, and associated administrative definitions, Oglethorpe oak is a species threatened with extinction in the foreseeable future.

### Home Range

Oglethorpe oak grows in the Georgia and South Carolina Piedmont, and in isolated pockets on the Coastal plain of Louisiana and Mississippi. There has been a number of other identifications made outside these areas, but all are in dispute. Figure 1. Altogether there are fewer than 150 historic locations identified, of varying site and tree quality. It is estimated there are less than 1,000 trees remaining.

There are approximately 70 sites in Georgia found in Elbert, Greene, Jasper, Oglethorpe, and Wilkes counties in the Northeast part of the State. There are about 70 sites in South Carolina found in Abbeville, Edgefield, Greenwood, McCormick, and Saluda counties in the Western part of the State. Three sites are found in Mississippi in Scott, Smith, and Jasper counties, all on the Bienville National

Forest (less than 100 stems total -- all less than eight inches in diameter). Two sites are in Alabama in Sumter and Wilcox counties. The last single site is found in Louisiana's Caldwell parish. Over the first 50 years since identification, about 10% of all trees were lost due to habitat loss and disease. Poor regeneration on wetland sites prevents new trees from establishing and thriving.

It is clear more trees probably exist but remain hidden in the marshes and stream bottoms of the Piedmont and Coastal Plain across the Southeast. Because mature trunks can be mistaken for other white oak group trees, a more careful examination is warranted. It is also clear land use changes have (and continue to) disturb forests and disrupt hydrologic processes responsible for regeneration of this species. Several sites identified in the first few decades after discovery, no longer contain any individuals of this species. Coupled with a serious pest problem (chestnut blight -- Cryphonectria (Endothia) parasitica), Oglethorpe oak may be on its way out of the ecological system of the Southeast.

### Who Are Your Parents?

There has been much confusion regarding the genetic background of Oglethorpe oak. In the field, it shares many Winter traits with white oak (Quercus alba) and post oak (Quercus stellata). Within the white oak group, Oglethorpe oak most closely resembles the bastard oak (Q. sinuata), with some people considering it a variety of bastard oak. Bastard oak was once considered to be part of the old Durand oak (Quercus durandii) species definition before it was broken apart. Note Oglethorpe oak is more similar to Quercus sinuata, as compared with bluff oak (Q. austrina), which was also considered a variety within the old Durand oak (Quercus durandii) species definition. Oglethorpe oak may be a relic derived from an outlying and disconnected population of bastard oak. Oglethorpe oak does form natural hybrids with white oak (Quercus alba).

### Sites Called Home

Oglethorpe oak grows in stream bottoms and on first terraces where soil are either heavy clays and poorly drained Piedmont soils, or marshy, poorly drained flatwood soils which are not sandy. Sites have very poor drainage, but are not necessarily prone to flooding. Good drainage and sandy soils are detrimental to growth. Acorn germination requirements are unclear but seem to be wet, poorly drained mineral soils, not stagnant standing water or soils completely saturated. Oglethorpe oak does not colonize new areas well and is easily out-competed for newly opened sites by herbaceous and shrub layer species. Acorns quickly lose viability within weeks of falling from the tree, if they are not damaged by fungi or consumed by animals.

Few trees have been moved successfully out of their habitats to upland, street, yard, or park sites. This species is difficult to successfully transplant and maintain, especially with chestnut blight fungus prevalent in native forests. Oglethorpe oak grows across Winter hardiness zone 7 and 8, and heat zones 5 and 6. Extending its growth range is possible, but reducing all stress-causing agents and control of chestnut blight would be essential.

Oglethorpe oak surviving in heavy, poorly drained soils can be partially explained because chestnut blight fungus cannot survive, nor move well, under these soil conditions. Oglethorpe oak grows in small wet areas where the blight cannot effectively attack. This also suggests Oglethorpe oak used to be in much greater numbers and on many more sites before 1900. It would have been decimated within the last century.

### Size Matters

Oglethorpe oak is a medium-large sized tree usually reaching 50 to 80 feet in height. Maximum expected size under ideal old-growth circumstances is 8 feet in diameter and 75 feet tall with a crown

spread of 70 feet. Expected normal size is 65 feet tall, 1.5 feet in diameter with a 45 feet crown spread. Under current site and pest constraints, stems grow straight with many bark faults and released sprouts developing a more narrow crown with a twiggy, crooked branch habit. One good example of tree form and growth proportion (for a ~45 year old tree), in an easily accessible location, is on the Oglethorpe county courthouse square in Lexington, Georgia. Another good example is a ~40 year old tree in the University of Georgia Warnell School's State Arboretum of Georgia near Braselton, Georgia.

## Leaves

Oglethorpe oak leaves are deciduous, simple, and alternate along twigs. Leaves are narrowly elliptical with the leaf widest at or just beyond leaf center. The leaf blade is thin but leathery, and yellowish-green in color. The leaf has a blunt tip with no bristle. Leaves are 2-6 inches long and 1-2.5 inches wide. Leaf margin are straight (entire) to slightly wavy. Some leaves, including juvenile leaves, can have edges which undulate strongly. Some juvenile leaves may also have rare shallow lobes or "bumps" along the leaf margin near the tip.

The leaf is smooth and somewhat shiny on top / upper surface. The underside of the leaf is covered with clumps, clusters or fields of tricombes (hairs), with density ranging from sparse to velvety. Tricombes are yellowish to tan in color and are branched with rays spreading parallel with the leaf surface. These tricombes are fused together at their base (in a pedestal) and spread apart near their tips. The main vein on the leaf underside is yellow in color. Leaves have a very short stock (petiole) of less than 1/4 inch in length.

In Fall and Winter, leaves turn bright reddish-brown fading to brown, and persist until late into the Winter. Figure 2 shows early Summer leaves. Figure 3 presents pressed mature leaves. Figure 4 shows the front and back of mature leaves. Figure 5 demonstrates the variability of mature leaf sizes within one tree.

## Field of Confusion

Oglethorpe oak leaves can be confused with bastard oak (*Quercus sinuata* -- which used to be a part of Durand oak -- white oak group). Bastard oak leaves have grey to grey-green colored tricombes on lower surfaces and acorns have very small caps. Oglethorpe oak leaves can also be confused with wide willow oak (*Q. phellos* -- red oak group) leaves, except for willow oak's bristle tip and no tricombes on the underside except tufts in vein axils. Shingle oak (*Q. imbricaria* -- red oak group) can also be confused with Oglethorpe oak, although the native ranges do not overlap. Shingle oak is a more Northern tree in the Central hardwoods. Shingle oak has leaves which are shiny on the upper side and pale with white hairs beneath. Shingle oak leaves usually have a bristle tip.

Figure 6 presents three tree species with similar appearing leaves to Oglethorpe oak and their general growth ranges. Note bastard oak *Quercus sinuata* and bluff oak *Quercus austrina* overlap ranges with Oglethorpe oak. The best features to use in identifying Oglethorpe oak are white oak-like bark, narrow elliptical and unlobed leaves, and relatively dense yellowish star-shaped hairs on leaf undersides.

## Flowering

Oglethorpe oak is a monoecious tree with both sexes of flower separated into either male or female flowers on the same tree. Male flowers are dangling catkins growing from axils of last years leaves. Male flowers release pollen into the turbulent winds of Spring. Wind delivers pollen to receptive female flowers growing near the ends of twigs. Female flowers are small, short, greenish-colored spikes. Female flowers are easily damaged by late frosts, fungi, and insects, leading to poor acorn crops in many years. Oglethorpe oak flowers in early April.

## Acorns

Oglethorpe oak's seed is a solitary or paired acorn. The acorn is small ( $\frac{1}{2}$  to  $\frac{2}{3}$  inches long), round to oval, dull looking, dark reddish-brown in color, and covered with small fine flattened tricombes. The acorns grow directly from the twig or on very short stalks ( $< \frac{1}{4}$  inch long). The acorn cap is bowl-like, not saucer-shaped, covering  $\frac{1}{3}$  to almost  $\frac{1}{2}$  of the acorn. The cap has many flattened, dull reddish-brown to grey-colored, hairy scales. The seed matures in the same year as it forms, and has no cold requirement for germination. Acorns grow from the first year's twig. The seed immediately starts to germinate when it falls, but is prone to many types of damage in wet understories. Acorn crops are usually small in number with poor viability caused by both fungal infection and insect larvae. Acorns fall in October and November.

## Buds, Twigs & Bark

Oglethorpe oak's twigs are somewhat shiny brown with purplish and red tints when young, turning grey with age. Twigs have a few scattered, stalked star-shaped tricombes when young, becoming smooth with age. Terminal buds are reddish-brown to brownish-grey in color, blunt, and small ( $< \frac{1}{10}$  of an inch long) with rounded, hairy scales. Leaf scars are half round in shape and show many bundle scars. Lenticels are noticeable, slightly oblong shaped, and light grey in color.

There are usually many sprouts growing along the stem and branches, especially when a tree is stressed. The crown usually appears filled with sprouts and a dense growth of twigs. Periderm of Oglethorpe oak is typical of white oaks. Periderm is light grey to dull whitish in color with thin, scaly plates. Periderm appears to be at a slightly smaller scale and more stringy than white oak. Smooth patch, a bark rotting fungi, may be present. Oglethorpe oak periderm can be confused in the field with white oak (*Q. alba*), post oak (*Q. stellata*), and sand post oak (*Quercus margaretta*) periderm characters.

## Wood

The wood of Oglethorpe oak is ring porous. Mechanical properties are similar to white oaks. There are several noticeable differences between Oglethorpe oak and other white oaks – hardness value, compression strength, bending strength, and shear strength are all significantly greater in Oglethorpe oak. Shrinkage rate upon drying was considered moderate compared with other white oaks. Only live oak, among the white oaks, is more dense than Oglethorpe oak. Oglethorpe oak specific gravity is 0.69 for green wood and 0.76 for dry wood. Care should be taken with these wood property values as they were derived from a small number of medium-small diameter trees with slow growth (~16 annual increments per inch).

## Serious Pest

Oglethorpe oak is burdened with a susceptibility to chestnut blight. This blight organism remains resident in native oak forests, living as a minor pest on other white oaks (i.e. post oak – *Quercus stellata*). Chestnut blight attacks Oglethorpe oaks especially hard when the tree is stressed by site resource changes, or by injury. Soil drainage improvements can initiate attacks. New wounds are easily infected. Chestnut blight generates stem and branch cankers which kill the cambium area. Initially, the canker swells pushing out and cracking the periderm. Later as the canker ages, the canker area becomes sunken as the tree attempts to compartmentalize infection sites. Periderm over the canker can fall away leaving lines and fields of many tiny orange-yellow fruiting bodies. Multiple cankers grow and girdle the stem, killing any tissue above. Oglethorpe oak usually releases sprouts below cankers.

Chestnut blight is so damaging, most other pests which attack white oaks can be present but are overshadowed in their impact by the blight. Chestnut blight causes many stem and branch cankers to

form, many dormant buds to be released forming sprouts, and generates a crown with many dead twigs and branches before death. All the pathology research work has concentrated on resurrecting the American chestnut (*Castanea dentata*), not Oglethorpe oak. There is no cure or treatment of practical use. Within another 40 years, all large Oglethorpe oaks may be gone. Within this century, the species may become extinct.

### Mindful Things

Oglethorpe oak can be treated as a white oak in most management systems. Managerial peculiarities concern sites and the ever present chestnut blight fungi. Key components of good management is not changing how water moves in or across soil. Improving drainage or altering water movement can generate poor growing conditions, abiotic stress, and opportunities for pests. Oglethorpe oak is not tolerant of resource limiting competitors, especially invasive exotics. It is a poor invader of newly opened sites even with scarification of the litter layer. Because Oglethorpe oak stump sprouts form from small and medium sized trees, this oak can hold onto sites through vegetative means.

Care must be taken with dry season fires as Oglethorpe oak seedlings and pole-size trees are fire sensitive. Running prescribed fires into bottoms should be avoided. It is also critical oak sites be fenced and domestic animal grazing be prevented. Silvicultural use of a single tree selection or group selection cutting prescription should be used which exposes mineral soil and releases some light resources, but controls shrub layer competitors. Exploring chemical competition control with this species is needed. More silvicultural research is required for effective Oglethorpe oak management.

### What's Left

Since its discovery, almost 90% of the original Oglethorpe oak sites still remain but individual tree loss continues. Sites lost include a lake inundation, land-use changes, and site clearance. Because of soil productivity values and access problems associated with many Oglethorpe oak sites, most of the trees remaining are probably buffered from much active land use changes. Unfortunately, most of the damage to Oglethorpe oak populations occurred in the previous 200 years before botanical discovery when land clearance, settlement, agricultural production, and chestnut blight all took their toll. More sites and trees exist, but systematic surveys away from current growing locations are not available. Figure 7 shows the potential growth range of Oglethorpe oak..

### Conclusions

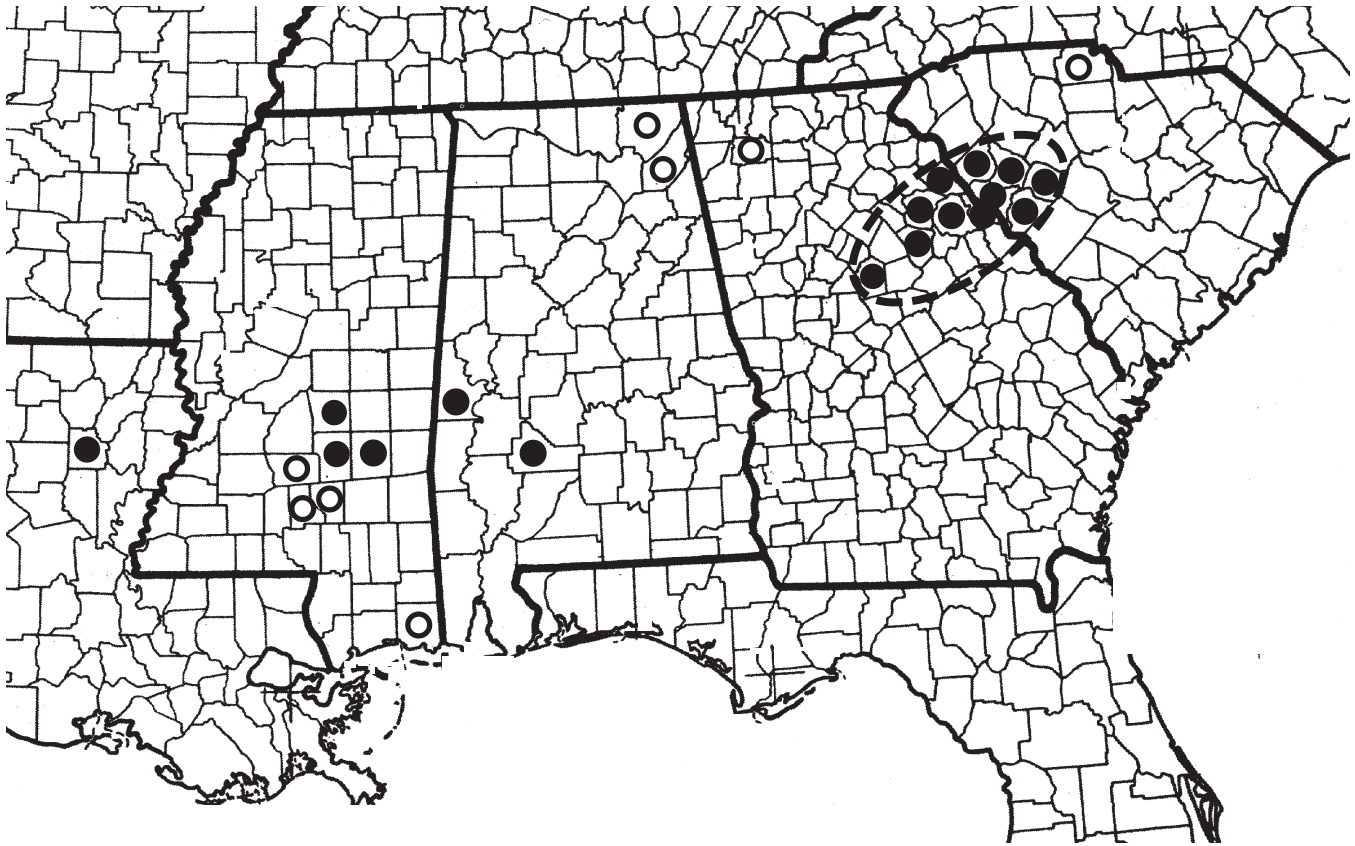
Oglethorpe oak was probably once a widely distributed oak species across the Sunbelt. It has been limited and isolated by climatic changes in the last 10,000 years. Because of its periderm, and winter appearance, it was probably always lumped into the white oak group and not identified in the field to species. Firewooding, grazing, and land clearance of the 19th century constrained growth and regeneration.

The arrival of an exotic virulent pathogen in the 20th century, coupled with small woodlot management in the early part of the century, put down and cleaned up many stems. The tree survives in highly stressful environments for which it is not well adapted, because in these types of sites it escapes the full ravages of the pathogen. Today we see a shadow of a former Eastern North American hardwood species. The ecological sun is setting on Oglethorpe oak.

The University of Georgia is committed to principles of equal opportunity and affirmative action.

## Selected Literature

- Bishop, G.N. & W.H. Duncan. 1941. A new white oak from Georgia: Its associates and habitat. *Journal of Forestry* 39:730-731.
- Chafin, L.G. 2007. **Field Guide to the Rare Plants of Georgia**. State Botanical Garden of Georgia and the Georgia Plant Conservation Alliance, Athens, GA. Pp.526.
- Coombes, A.J. & W.N. Coates. 1997. Oglethorpe and the Oglethorpe oak. *Arnoldia* 57(2):25-30.
- Duncan, W.H. 1940. A new species of oak from Georgia. *American Midland Naturalist* 24(3):755-756.
- Duncan, W.H. 1950. Quercus oglethorpensis – Range extensions and phylogenetic relationships. *Lloydia* 13(4):243-248.
- Duncan, W.H. & M.B. Duncan. 1988. **Trees of the Southeastern United States**. University of Georgia Press, Athens, GA.
- Haehnle, G.G. 1983. The phyto geography, autecology, and chemotaxonomy of the Quercus oglethorpensis population in South Carolina. *Forestry Abstracts* 44(11):711.
- Haehnle, G.G. & S.M. Jones. 1985. Geographical distribution of Quercus oglethorpensis. *Castanea* 50(1):26-31.
- Kirkman, L.K., C.L. Brown, & D.J. Leopold. 2007. **Native Trees of the Southeast**. Timber Press, Portland, Oregon. Pp.370.
- Kral, R. 1983. **A Report on Some Rare, Threatened, or Endangered Forest-Related Vascular Plants of the South** – Volume I: Isoetaceae through Euphorbiaceae. Paper #36. USDA-FS-Southern Region, Technical Publication #R8-TP 2. Atlanta, GA.
- Lee, A.W.C. & M.A. Taras. 1985. Strength & related properties of Oglethorpe oak. *Forest Products Journal* 35(2):50-52.
- Little, Elbert L., Jr. 1977. **Atlas of United States Trees: Volume #4 -- Minor Eastern Hardwoods**. USDA-Forest Service, Miscellaneous Publication #1342. Washington D.C.
- Marx, P.S. & R.D. Thomas. 1975. A survey of the vascular plants of Caldwell Parish, Louisiana. *Louisiana Academy of Sciences* 38:75-85.
- Miller, H.A. & S.H. Lamb. 1985. **Oaks of North America**. Naturegraphs Publishers, Happy Camp, CA. Pp.327.
- Patrick, T.S., J.R. Allison & G.A. Krakow. 1995. **Protected Plants of Georgia**. Georgia Department of Natural Resources, Georgia Natural Heritage Program. Social Circle, GA.
- Stein, J., D. Binion, & R. Acciavatti. 2003. **Field Guide to Native Oak Species of the Eastern North America**. USDA-FS FHTET-2003-1.
- Thomson, P.M. & R.H. Mohlenbrock. 1979. Foliar tricombes of Quercus subgenus Quercus in the Eastern United States. *Journal of the Arnold Arboretum* 60:350-366.
- Weakley, A.S. 2010. **Flora of the Southern and Mid-Atlantic States**. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, NC. (internet resource).
- Wiseman, J.B. 1987. Quercus oglethorpensis in Mississippi. *Castanea* 52(4):314-315.



- ( - - - ) = general range area**
- = outlying populations**
- = disputed / mis-identified populations**

Figure 1: Current native range of Oglethorpe oak -- Quercus oglethorpensis.



Figure 2: Oglethorpe oak leaves .  
(photo credit Dr. Kim D. Coder)





Figure 3: Pressed Oglethorpe oak leaves from an Oglethorpe County, Georgia source on a 1x1 inch grid.  
(photo credit Dr. Kim D. Coder)

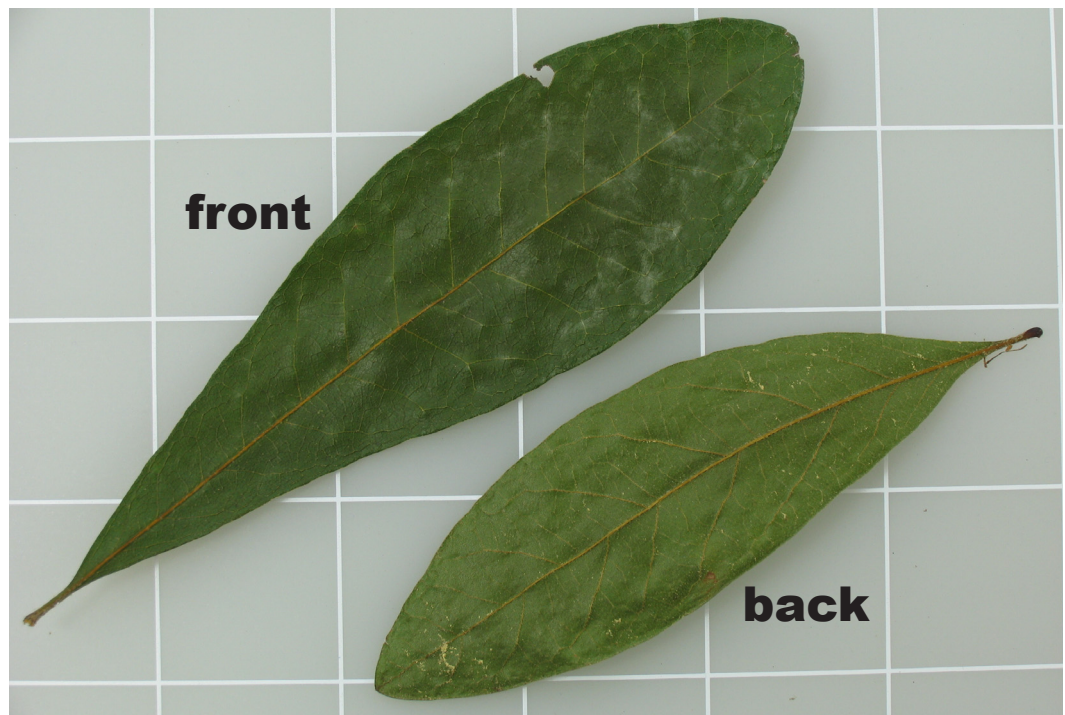
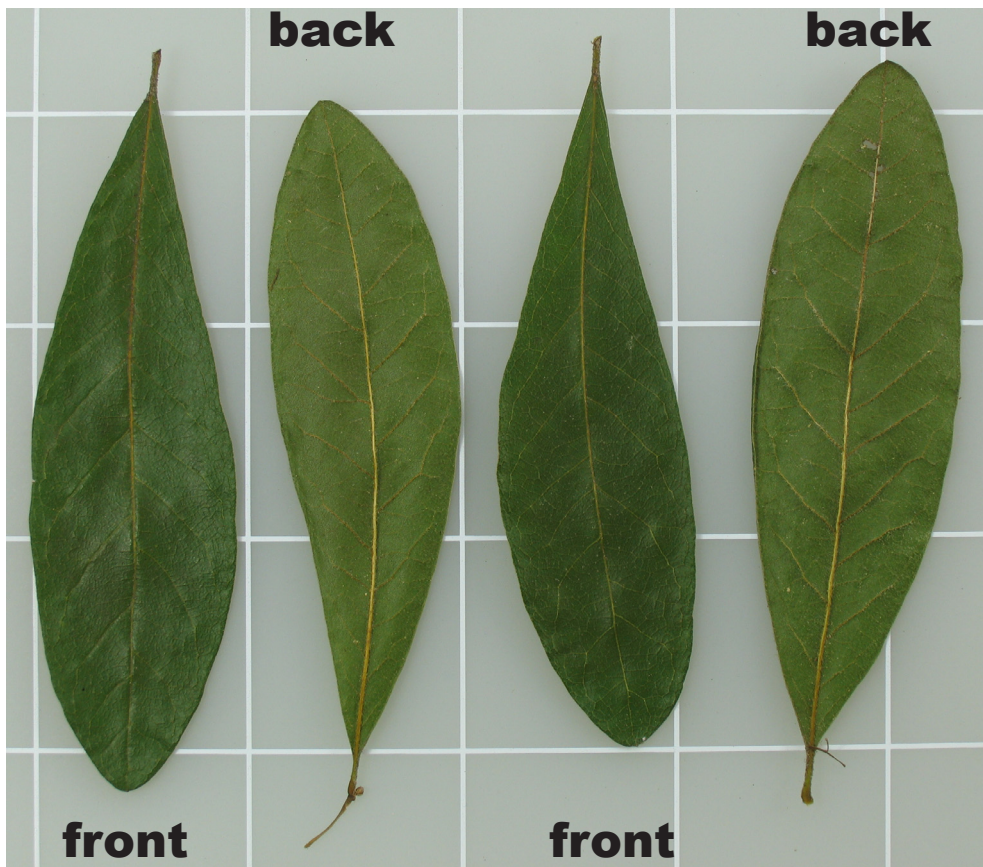


Figure 4: Front and back of pressed Oglethorpe oak leaves from Oglethorpe County, Georgia source on a 1x1 inch grid.  
(photo credit Dr. Kim D. Coder)

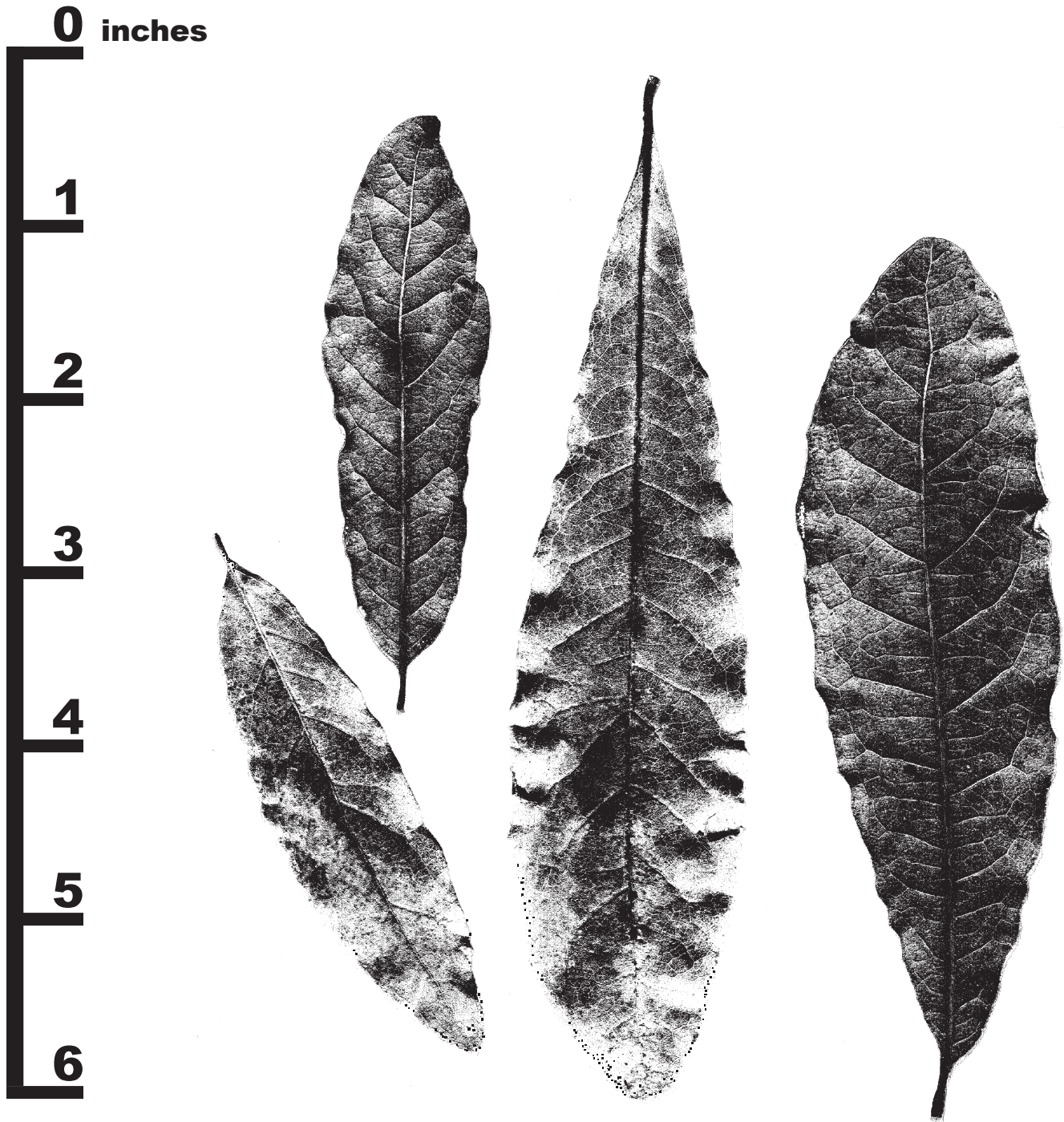


Figure 5: Scan of selected pressed leaves from Oglethorpe oak showing variability in leaf size.  
(leaves from Oglethorpe County, GA.)

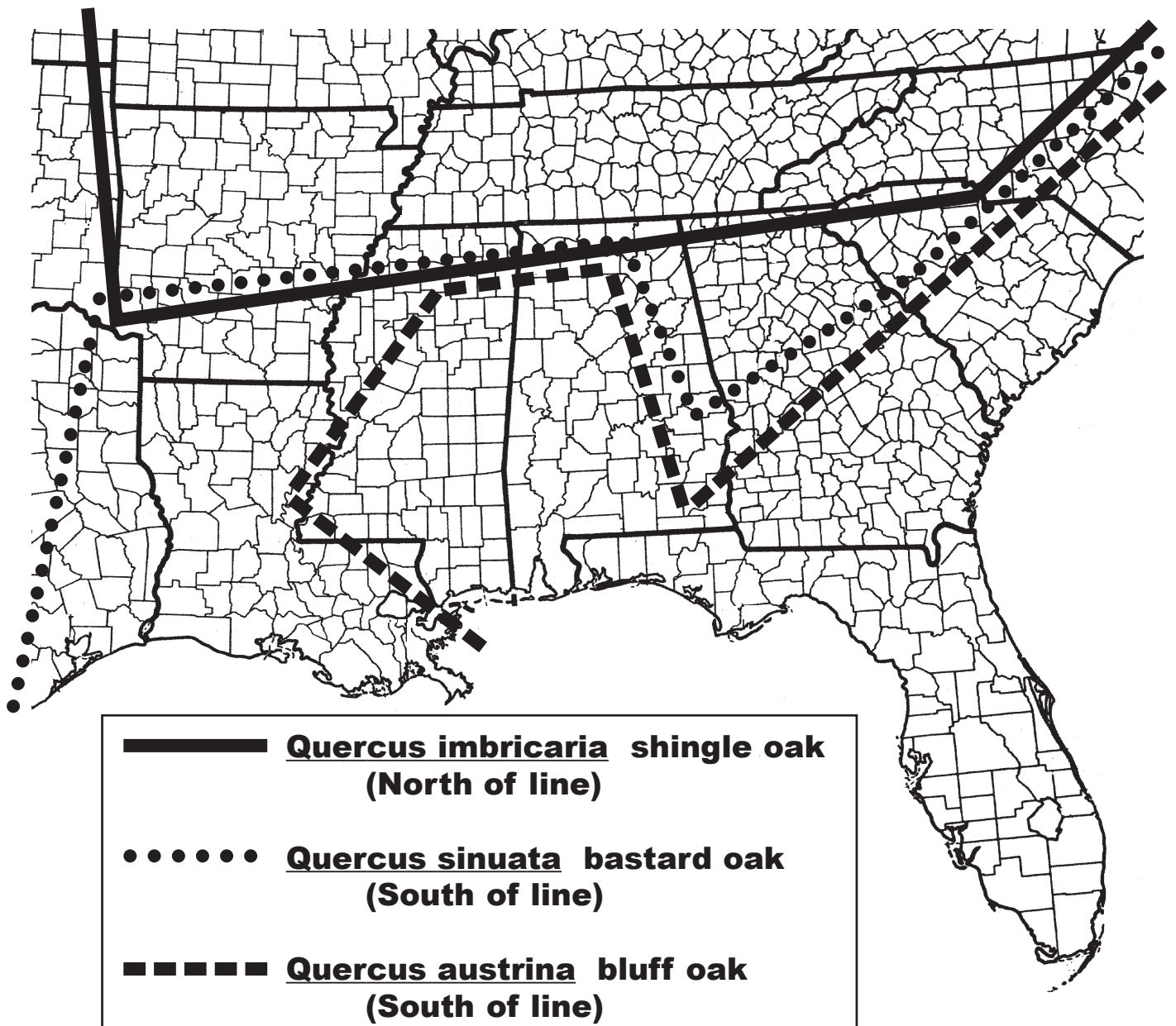


Figure 6: Range limits of tree species sometimes confused with Oglethorpe oak (*Quercus oglethorpensis*). The whole species range is not shown, just the range limit close to or overlapping with Oglethorpe oak. Note *Q. imbricaria* is in the red oak group.

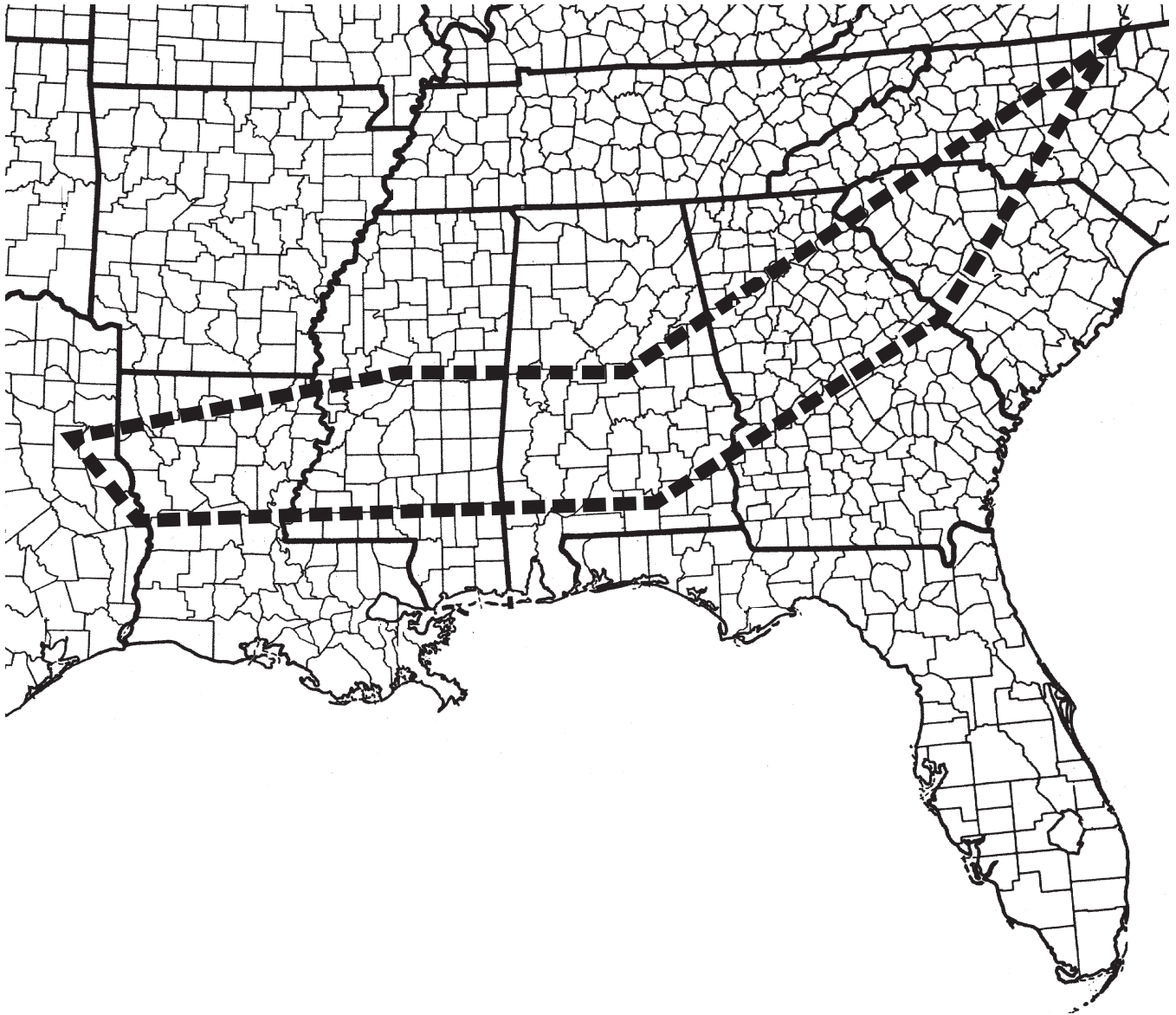


Figure 7: Potential growth range and search area for additional Oglethorpe oak -- Quercus oglethorpensis populations in the Southeastern United States based upon silvics and site preferences. (potential finds could occur within the area bounded by dotted line)